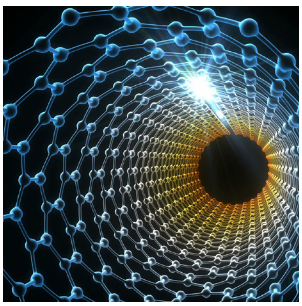
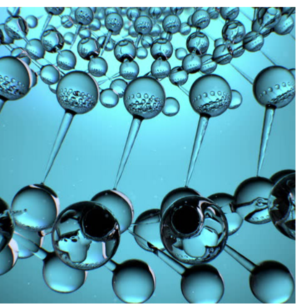
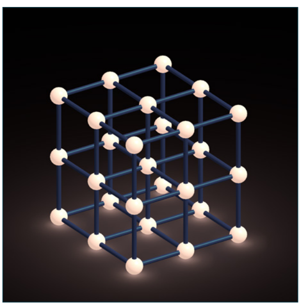
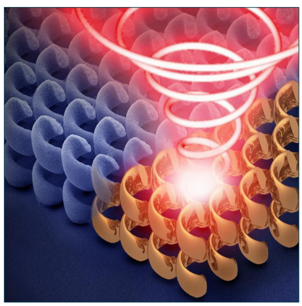
Keynote Forum
May 16, 2019

Nanomaterials 2019
Nanoscience 2019



Joint Event on

2nd International Conference on

Nanomaterials and Nanotechnology

&

22nd International Conference on

Advanced Nanoscience and Nanotechnology

May 16-17, 2019 | Prague, Czech Republic

Mater Sci Nanotechnol, Volume 3

Huijun Zhao

Griffith University, Australia

Unlocking catalytic powers of nonprecious nanomaterials

Although the precious metal-based materials are widely recognized as superior catalysts for clean energy applications, their large-scale commercial use has been hindered by their expensive and scarcity nature. The development of high performance, plentiful and cheap nonprecious materials-based catalysts is therefore vital for the commercial viability of clean energy future. Unfortunately, the most of nonprecious materials in their pristine forms possess little or no catalytic activity. As such, unlocking the catalytic activities of nonprecious materials has become an important scientific task, but highly challenging.

This presentation reports a number of broadly applicable approaches to unlock the catalytic activities of nonprecious nanostructured materials. A number of examples from our recent investigations will be used to demonstrate the effectiveness and applicability of such approaches.

Speaker Biography

Huijun Zhao obtained his PhD in Chemistry (1994) from the University of Wollongong, Australia. He held Research Fellow/Senior Research Fellow positions during 1994-1997 in the University of Wollongong and University of Western Sydney. He took a Lecturer position at Griffith University in 1997 and was subsequently promoted to Senior Lecturer (2001), A/Professor (2003), Chair Professor of Griffith Commercialization Laboratory (2005). He currently holds a professorial position in School of Environment and Science and is the Director of the Centre for Clean Environment and Energy at Griffith University. He is also the Director of the Centre for Environmental and Energy Nanomaterials at the Institute of Solid-State Physics, Chinese Academy of Sciences. He has won several awards such as The R.H. Stokes Medal and University Research Leadership Award and is the Fellow of the Royal Society of Chemistry (FRSC) and the Fellow of the Royal Australian Chemical Institute (FRACI). He has expertise in energy and environmental nanomaterials, water source control and management system, field-based sensing technologies and aquatic environmental quality assessment. One of his current pursuits is to explore new means to unlock the catalytic powers of nonprecious materials as high performance catalysts for important catalysis reactions. He has published over 400 refereed journal papers that attracted over 22,000 citations and earned him an H-index of 78. He has also gained 68 international patents within 8 world-wide patent families in functional nanomaterials & nanotechnology, photoelectrocatalysis and environmental monitoring systems.

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Miriam Colombo

University of Milano-Bicocca, Italy

Bio-functionalized colloidal nanoparticles for therapeutic applications

Multifunctional nanoparticles are promising bimodal tracers for noninvasive diagnosis and treatment of cancer and inflammatory diseases *in vitro* and *in vivo*. The design of bio-functionalized colloidal nanoparticles needs careful optimization of size and shape, optical and magnetic properties, and efficient conjugation with homing ligands to improve the signal amplification and target selectivity toward malignant cells. One of the greatest challenges in designing nanoparticles functionalized with homing peptides and proteins to optimize molecular recognition resides in the possibility to finely control the ligand orientation on the nanoparticle surface.

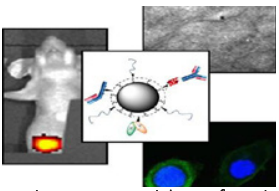

Figure1: Magnetic nanoparticles functionalized with Trastuzumab or Ab fragments for targeting and treatment of breast cancer cells *in vitro* and *in vivo*

To support the research in new drug delivery nanosystems, in the past few years new administration methods of nanoparticles rather than traditional intravenous ones have been explored. This is a highly innovative approach that is nearly unexplored at present. Because of parenteral administration draw-backs, alternative administration routes have been investigated. Among all, the oral and topical administration are the most interesting to obtain a local effect and gain a better patient's compliance.

Speaker Biography

Miriam Colombo obtained her master's degree in 2008 in Medicinal Chemistry and Technology at the University of Milano with experimental thesis in the Nanobiotechnology and she made the PhD in Biology in 2012 at the University of Milano-Bicocca. In 2010, she worked in the lab of prof. W. Parak, Marburg, Germany. In January 2009, she was awarded of a 12+24 months fellowship in the field of Medical Sciences. From September 2013, she is a researcher in clinical biochemistry (BIO/12), at the Department of Biotechnology and Bioscience of University of Milano-Bicocca. She is author of 70 scientific publications on peer-reviewed international journals and official H-Index (Scopus): 22.

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Mater Sci Nanotechnol, Volume 3

Johan Alauzun

Yanhui Wang, Maroua Bouchneb and P Hubert Mutin

Institut Charles Gerhardt Montpellier, France

Oxide nanomaterials by non-hydrolytic sol-gel process

The non-hydrolytic sol-gel process involves the reaction in non-aqueous media of several precursors (from transition metals, post-transition metals or metalloids) with organic oxygen donors instead of water. The reaction of chloride precursors with an ether or an alkoxide at 80 up to 150°C has provided useful alternatives to conventional sol-gel routes for the design of oxide and mixed oxide materials. This preparation can lead to interesting morphologies (figure 1) and crystallinities. These nanomaterials have been successfully used as heterogeneous catalyst, as well as energy materials. In this presentation, I will focus on recent results concerning other non-hydrolytic routes involving for instance ester elimination (Figure 2), or original.

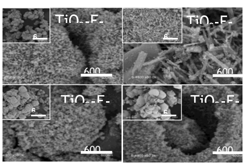

Figure 1: SEM images of calcined TiO_2 samples

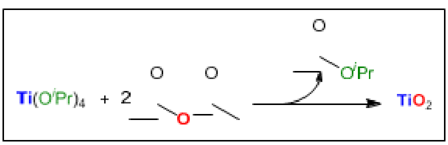

Figure 2: Synthesis of TiO_2 using acetic anhydride as an oxygen donor

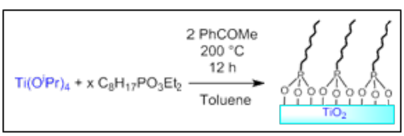

Figure 3. Non-hydrolytic sol-gel synthesis of titanium oxophosphonate hybrid materials

Speaker Biography

Johan Alauzun is an associate professor of the University of Montpellier. He is mainly focus on mesoporous hybrids and oxide materials as well as surface modifications. He has 48 publications that have been cited over 1300 times and his publication H-index is 18.

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Carlos Pagliosa

Adão Campos and Vanderlúcio Madalena

RHI Magnesita, Brazil

Improving carbon efficiency in refractory industry with nanographite brick technology

Refractory is a key part on the production of all metals used by the modern society. Steel presents the highest demand on most of our day by day use from automotive exteriors to garbage cans and rail. The refractory industry is driven by the development of new or improved processes demanded by the customers and steel industry has been pointing out the tendency for high quality steel which requires sophisticated manufacturing technologies and decarburization rate for the low carbon content below 20ppm. As the requirements for steel quality have become increasingly strict with strong demand for high strength and high toughness steel plates, a new refractory generation with extra low carbon was developed. Besides the advantages of energy economy in steel process and higher clean steel, another additional benefit includes less CO_2 emissions.

Extra low carbon bricks mean less thermal conductivity products and only can be achieved by replacing natural graphite by special nanographite. This new raw material was conceived to withstand the same oxidation resistance than natural flake graphite to compensate the nano particle size and also to achieve the desired properties to match the requirements for steel industry trials. This work presents the nanographite approach to the real application in steel production with an expressive reduction in the amount of graphite from 5%wt to 1%wt. Properties and customer's trial with nanographite bricks in steel ladle are also shown with improving carbon efficiency in an environmental friendly product.

Speaker Biography

Carlos Pagliosa graduated in material engineer at Federal University of São Carlos (UFSCar), with MSc and PhD at UFSCar and post-doc study at ETH (Zurique). He has been a researcher in the refractory field for 25 years. Actually, on the position of researcher at RHI Magnesita's R&D, responsible for developing MgO-C refractories for BOF and bricks for ladles.

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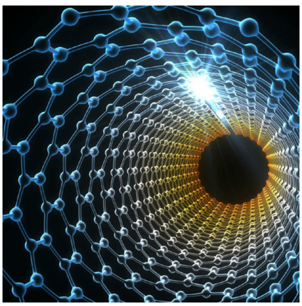

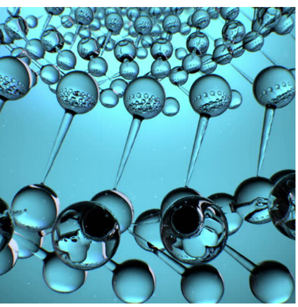

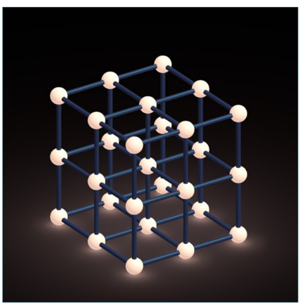

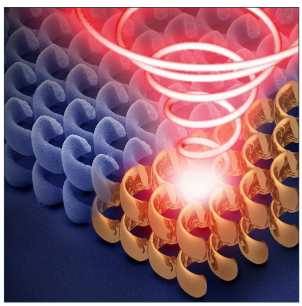

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Houzheng Wu

Loughborough University, UK

Nanocomposite design, manufacture and performance

Nanocomposite is generally defined as having a microstructure consisting of at least one constituent in a size ranging from a few to tens nanometers along at least one dimension. In the past two decades, significant progress has been made in exploring manufacturing technologies and understanding their physical properties as well as engineering performance. However, new knowledge and novel nanocomposites are still coming up continually with more design strategy adapted to achieve expected performance or adventure unexpected. With the emergence of numerous novel 1D/2D/3D nano-reinforcements or precursors, nanocomposites are getting even more attention and interested than ever. In this talk, the progress of nanocomposite based on ceramics, polymers and metals will be reviewed by aligning them to the then manufacturing technologies and understanding level of their property and performance, followed by some successful nanocomposites with genuine impact generated on real world. Then the talk will focus on nanocomposite design with particular emphasis on the underlined design philosophy and principles, followed by examples to show the impact of design in achieving expected performance. In the past years, we have witnessed that novel manufacturing technologies have profound impact on the development of nanocomposites. Among these, new sintering technologies and bio-enabled technologies will be discussed with examples presented to show how diversified nanocomposites can be designed and developed to make impact in defense, transportation and energy technologies.

Speaker Biography

Houzheng Wu is a reader in materials science at Loughborough University. He was awarded DPhil in materials at Oxford University. His research interest includes nanocomposites, next generation nuclear graphites and ceramics, ceramic matrix composites, as well as bio-enabled manufacture and high entropy ceramics recently, aiming for application defense, nuclear power and transportation funded by EPSRC, TSB, DSTL and industry. His research has a strong link with application in industry including designing various materials to fit the application needs, and innovation and business exploitation is in progress.

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Ido Braslavsky

The Hebrew University of Jerusalem, Israel

Proteins that bind ice and their control on freezing

Ice-binding proteins (IBPs) are proteins that include antifreeze proteins (AFPs) on the one hand and ice-nucleating proteins (INPs) on the other hand. IBPs are found in organisms that live under subfreezing temperature conditions. IBPs depress the freezing point of the body fluids that prevents freezing of the organism in supercooled conditions, inhibits ice recrystallization, enable adhesion to ice and promote nucleation depending on their size. We are investigating the interactions of IBPs with ice surfaces. For example, we study the dynamic nature of the protein/ice interaction using fluorescence microscopy techniques combined with temperature-controlled microfluidic devices. The results show that binding of IBP to ice is irreversible, that the freezing temperature depression is sensitive to the time allowed for the proteins to accumulate on ice surfaces, and the distance between the proteins to be down to few nanometres. Our studies also revealed that IBPs can function in temperatures as low as -100°C, thus suitable for cryopreservation. We also found that the small IBPs adhere to ice and inhibit its growth, while the big IBPs nucleate new ice crystals. These results contribute to an understanding of the mechanisms by which the nanometric IBPs control ice growth and are critical for the successful use of IBP in cryobiological applications.

Speaker Biography

Ido Braslavsky is currently working as an associate professor at The Hebrew University of Jerusalem, Israel. He is also the head of BSc Program in Biochemistry and Food Science, Institute of Biochemistry, Food Science, and Nutrition. He is also the member of the Governors of the Society of Cryobiology. His research mainly focuses on ice growth and its control. His PhD studies were on Ice Physics at the Israel Institute of Technology. After postdoc positions at the Weizmann Institute of Science and at Caltech, where he conducted biophysics studies on DNA –proteins interactions and developed single-molecule DNA sequencing method, he initiated a study on ice-binding proteins biophysics at Ohio University Physics department. In the last ten years, his group published more than 30 papers on ice-binding proteins and ice growth control. His research has been supported by the National-Science-Foundation (NSF) and the Israel-Science-Foundation (ISF) and the European-Research-Council (ERC).

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Yaw-Kuen Li

National Chiao Tung University, Taiwan

Biorecognition and biosensing: From big to small

Biosensors have drawn much attention because of their great potential to facilitate biomedical research, drug discovery, environmental monitoring and diagnosis of diseases. A powerful bio-detection requires highly specific bio-recognition probes and sensitive elements. Several techniques, such as gold nano-particles (AuNPs), quartz crystal microbalance (QCM) and surface plasmon resonance (SPR), silicon nanowire field-effect transistor (SiNW-FET) and others have been extensively studied to improve the sensitivity of biosensing. Antibody is commonly used to conjugate with a sensing chip for a large molecule detection. Yet, for small molecule detection, new strategies need to be developed. We'll demonstrate a conventional method, based on protein engineering, to produce a bio-recognition probe and to construct an effective device for quantitatively sensing steroids. We'll further exhibit an open-sandwich immuno-recognition system containing VH and VL of a scFv for small molecules detection. The powerful technique for screening scFv from phage display library will also be discussed.

Speaker Biography

Yaw-Kuen Li received his PhD degree from Tulane University, USA, in 1991. After his postdoctoral research in School of Medicine of Johns Hopkins University, he moved back to Taiwan to start his academic career in 1993. He was promoted to the full professor in 2002. Further, he became the chair of the department (2004-2006) and the dean of college of science of National Chiao Tung University (2014-2017). His primary research interests include three major fields: Enzyme-based catalytic biological reactions, bio-recognitionand bio-sensors and solid-state/biological interface chemistry.

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